LORRY I. LOKEY LABORATORIES

About the capabilities of Lorry I. Lokey Laboratories

The University of Oregon's new "high tech extension service" is a signature research center affiliated with the Oregon Nanoscience and Microtechnologies Institute (ONAMI). Taken together, the value of the building's highly specialized instruments easily exceeds twice the cost of constructing the $16 million facility. The building's labs and other spaces are named as follows:

Alice C. Tyler Nanofabrication Facility

Here, members of the UO's Materials Science Institute will research new materials and devices with potential for technological and scientific applications. Students gain hands-on experience developing new libraries of nanomaterials, contributing green approaches to manufacturing and to evaluating the benefits and implications of new products, from alternative energy solutions to medical diagnostics, from electronics to cosmetics. The centerpiece of this facility is the FEI Helios Dual Beam-Focused Ion Beam (DB-FIB), which is designed to fabricate small structures and analyze surface features through electron and ion beam processes. The facility is adjacent to nanoimprinting, photolithography and e-beam lithography labs.

Bio-Optics Facility

The equipment in this shared facility, while primarily supporting biological research, includes a number of microscopes plus computer workstations for data analysis and processing of microscope images and video editing. One of the leading-edge instruments is the Bio-Rad Confocal Microscope, which uses lasers to scan specimens. It filters out collected light that is out of focus, so image resolution is very high.

Center for Advanced Materials Characterization in Oregon (CAMCOR)

This center is a comprehensive suite of capital-intensive instrumentation for the characterization of novel nanoscale and microscale materials, operated by expert personnel whose mission is to foster collaborative interactions among faculty and researchers at academic institutions and industries throughout the Pacific Northwest.

Microanalytical Facility

This facility specializes in highly sensitive and accurate analysis of the chemical composition and structure of materials that cannot be imaged or analyzed using visible light due to their small size. Minerals, glasses, ceramics, semiconductors, nanodevices, electro-optical materials, and archaeological specimens are just a few of the types of materials sent here for analysis. One of this lab's featured instruments is the FEI Quanta Scanning Electron Microscope, which uses a focused beam of electrons to scan a specimen and produce images that determine the size, shape, and crystal orientation of various materials. It can provide imaging resolution of objects as small as three or four nanometers, roughly the size of human DNA.

Surface Analytical Facility

The techniques available in this lab reveal the chemical composition of surfaces and image structures from the millimeter to the nanometer scale—as large as a grain of sand to as small as a few gold atoms clustered together. Understanding surfaces is important for the development of new materials, quality control in manufacturing, and research into the behavior of nanoparticles.

Featured equipment includes the ION-TOF Time-of-Flight Secondary Ion Mass Spectrometer (TOF-SIMS), which shoots a pulsed beam of ions at a surface and knocks off atoms and molecules. These atoms and molecules then travel to a collector and, based on their time of travel, the TOF-SIMS can determine their mass, the key to revealing the elemental composition of the original surface.

X-Ray Diffraction Lab

X-ray diffraction is a nondestructive technique for analyzing a wide range of organic and inorganic materials such as fluids, metals, minerals, polymers, catalysts, plastics, pharmaceuticals, thin-film coatings, ceramics, and semiconductors. Instruments in this lab apply x-ray beams to a sample, resulting in a scattering of the beams (diffraction). The diffraction is then analyzed to determine the crystal structure and chemical composition of the sample. One of the highly specialized instruments in this laboratory is the Bruker D8 Discover Thin Film X-ray Diffractometer, which is optimized to analyze thin films used in technologies such as semiconductor devices and optical coatings.

High Resolution Lab

This facility provides imaging of ultra thin samples on the order of approximately 100 nanometers thick, or about 1/1,000th the width of a human hair. Such samples are prepared with the Helios Dual Beam-Focused Ion Beam, located in the Alice C. Tyler Nanofabrication Laboratory. The showcase instrument in the High Resolution Lab is the FEI Titan Transmission Electron Microscope (TEM), which has a specified resolution of 0.5 Angstrom—or less than 5/100ths of a nanometer. This is the size of an atom of lithium, the third smallest element. The ability to image structures this tiny is increasingly essential for materials research, precision manufacturing, green chemistry, and other breakthrough scientific endeavors.

Central Collaboration Area

This "intellectual fusion" space facilitates a culture of collaboration among researchers from on and off campus. With a common work area, new research can develop through faculty interaction.

Loomis Group Conference Room

This cyber-enabled meeting environment—named for Loomis Group, the international marketing company founded by president and chief executive officer Jeff Loomis '63—allows faculty, students, and industry collaborators to present findings to interested research groups outside Oregon.

Partnership Laboratories

Beaverton-based Voxtel, Inc. is the first company to reserve prime space in the Partnership Laboratories. The company is an award-winning maker of high-performance photonic devices used for a wide range of government, industrial and scientific markets including space applications.

Semiconductor Lab

Primarily a teaching space for graduate students in chemistry and physics, this lab will continue to build on the innovative master's degree program affiliated with the UO Materials Science Institute, which combines interdisciplinary, industry-informed curricula with internships for every student. Students in this program also collaborate with law and M.B.A. students in the Technology Entrepreneurship Program.